## E.5 Nevada Operations Office Summary

For over 40 years, the primary mission of the Department of Energy's Nevada Operations Office (DOE / NV) was to conduct research, development, and testing of nuclear devices. Most testing took place at the Nevada Test Site, but nuclear testing activities have also been conducted at eight off-site locations in five different states.

*The Nevada Operations Office manages facilities on the Nevada Test Site, which covers 1,350 square miles of land about 65 miles northwest of Las Vegas, Nevada. In addition, the Nevada Operations Office is responsible for environmental management at off-site test areas where radiological contamination has occurred including: Amchitka Island (Alaska); Central Nevada Test Site (Nevada); Project Chariot (Alaska); Project Gasbuggy (New Mexico); Project Gnome-Coach (New Mexico); Project Rulison (Colorado); Project Rio Blanco (Colorado); Project Salmon (Mississippi); and Project Shoal (Nevada).*

The ***Nevada Test Site*** is located in a remote region of Nevada and is roughly the size of the State of Rhode Island. In addition to weapons testing, the Nevada Test Site has hosted secondary missions including: neutron and gamma-ray interaction studies; open air reactor, nuclear engine, and nuclear furnace tests; hazardous materials spill response testing; and a variety of other experiments involving radioactive and non-radioactive materials conducted by the Department of Defense.

***Amchitka Island*** was the site of three underground nuclear detonations conducted in October 1965, October 1969, and November 1971. These tests were conducted for seismic testing, calibration, and warhead development.

The ***Central Nevada Test Site*** was used for one subsurface nuclear test, Project Faultless, detonated in January 1968. The Department conducted the test to determine the suitability of the area for additional testing. It also conducted nonnuclear special experiments to determine the behavior of seismic waves.

The ***Gnome-Coach*** and ***Gasbuggy Sites*** were part of the Plowshare program, which was a series of nuclear and conventional tests conducted by the Atomic Energy Commission to explore peacetime uses of nuclear explosives. The Project Gnome

test was conducted in bedded salt in December 1961. The Gasbuggy Site was the location of a single subsurface nuclear test in December 1967.

The ***Rio Blanco*** and ***Rulison*** tests, also part of the Plowshare program, were designed to increase natural gas production from low-permeability sandstone. The Project Rulison detonation took place in September 1969 in a sandstone formation. The Project Rio Blanco consisted of the nearly simultaneous detonation of three devices in a deep well in May 1973.

The ***Salmon Site*** was used for two nuclear detonations, Salmon and Sterling, to evaluate the seismic response of salt deposits to nuclear explosives. Salmon Site was also the location for two nonnuclear gas detonations used for seismic decoupling studies in the Miracle Play Program. The Department conducted the Salmon test in the Tatum Salt Dome in October 1964. It detonated the Sterling test in the Salmon cavity in December 1966.

The ***Project Shoal Site*** nuclear test was conducted in October 1963. The purpose of the test was to determine the effect of a nuclear detonation in a granite rock formation and to compare the seismic activity of natural earthquakes with activity from an underground nuclear explosion.

The ***Tonopah Test Range***, northwest of the Nevada Test Site, is used by the Department of Energy's Albuquerque Operations Office and the Department of Defense for research and development of ordnance delivery systems, electronic combat training missions, and other activities. The Nevada Operations Office has environmental restoration responsibilities for historic DOE/NV testing activities conducted at the site. For planning and control purposes, the Tonopah Test Range is considered to be part of the NTS.

### *E.5.1 End State*

The Nevada Test Site is a Defense Programs site. The primary mission of the site is nuclear stockpile stewardship including the maintenance of readiness to conduct underground nuclear tests as directed. Decisions regarding future land use on the Nevada Test Site are awaiting completion of the Resource Management Plan, which is scheduled for completion in October 1998. Future land uses for the Nevada Test Site, as well as potential uses of facilities that are to be decontaminated and decommissioned are being developed at this time in compliance with commitments contained in the Nevada Test Site Environmental Impact Statement. Decisions involving resource management, future land use, and private development will be done in partnership with the interests of the Department of Energy, national laboratories, the U.S. Air Force, the Bureau of Land Management, Tribal Nations, State and local agencies, and stakeholders.

Responsibility for land use on the Tonapah Test Range falls within the purview of the Department of Defense, U.S. Air Force. The Department of Defense is in the process of developing an Environmental Impact Statement governing Air Force activities on the Nellis Air Force Range, which includes the Tonapah Test Range.

**The Offsites Projects**

Amchitka Island (Alaska), Project Rio Blanco (Colorado), Project Rulison (Colorado), Project Salmon (Mississippi), Central Nevada Test Site (Nevada), Project Shoal (Nevada), Project Gasbuggy (New Mexico), and Project Gnome-Coach (New Mexico) will have surface areas released for alternative uses without restriction and / or transferred to the U.S. Fish and Wildlife Service (Amchitka), the State of Mississippi (Project Salmon), or the U.S. Bureau of Land Management. The subsurface will require controlled access. Environmental monitoring of the surface areas, if necessary, will be implemented per agreements with the individual State regulators. Upon establishing an agreement with the individual States, Tribal Nations, and other stakeholders, long-term surveillance and monitoring of the subsurface is assumed in perpetuity and planned for 100 years. Exhibit E-23 provides a summary of the currently assumed site end states for sites being managed by the Nevada Operations Office.

Exhibit E-23

Summary of Nevada Operations Office End States

| Site Name | End State Description |
|---|---|
| Nevada Test Site | Decisions regarding future land use on the NTS are awaiting the completion of the Resource Management Plan, which is scheduled for October 1998. Surface soil plumes that straddle or extend outside the NTS boundaries will be characterized and remediated. Soil areas within the boundaries of the site will be characterized and monitored. Subsurface contaminants in and around the underground shot cavities will not be remediated since cost-effective remediation technologies have not yet been demonstrated. All of the site will remain under controlled access, however economic redevelopment is possible for the southwestern portion of the site. |
| Amchitka Island | TRU and mixed TRU will be characterized and shipped to WIPP. On-site MLLW will be treated and disposed of on or off site. Environmental Restoration generated MLLW will be disposed of. LLW from approved generators on and off site will be disposed of in Area 3 and Area 5 of the Nevada Test Site. Filled disposal pits and trenches will be closed and capped according to approved closure designs and plans. |
| Central Nevada Test Area, Project Gas Buggy, Project Gnome-Coach, Project Rio Blanco, Project Rulison, Project Shoal | DOE will not maintain an active presence at this site. It is currently anticipated that following completion of all remedial activities, the surface areas of Amchitka Island will be released for alternate uses. This site will be released to the U.S. Fish and Wildlife Service as part of the Aleutian National Wildlife Refuge. However, it is also anticipated that the Department of Energy will maintain subsurface restrictions (institutional control) on all subsurface areas in proximity to the shot cavities. |

Exhibit E-23 (Continued)

| Site Name | End State Description |
|---|---|
| Project Salmon | DOE will not maintain an active presence at this site. Following completion of all surface remediation, the surface of the Salmon Site will be released for future use and site ownership officially transferred to the State of Mississippi. The State of Mississippi intends to use the surface as a wilderness area. DOE will maintain subsurface restrictions and institutional controls for all groundwater and subsurface areas in proximity to the shot cavity. |
| Tonopah Test Range | The site is currently part of the Nellis Air Force Range and the Department of Defense is responsible for the site future use. Soil hot-spots will be removed and cleaned to levels agreed upon with the state. Contamination in the industrial areas at the site will be closed in place and covered with engineered caps. The site is expected to remain under controlled access. |

### *E.5.2 Cost and Completion Dates*

Nevada Operations Office has divided its environmental management work into ten discrete projects comprising six environmental restoration projects and four waste management projects. A Project Baseline Summary exists for each project and contains detailed programmatic information, including cost, schedule, scope, end state, and interim milestones. A summary of the Nevada Operations Office cost and schedule information is illustrated in Exhibit E-24. Although the Nevada Test Site EM mission is scheduled for completion in 2014, NTS will be open to receive low-level waste from other sites through 2070. For additional information on these projects, refer to the Project Baseline Summaries. The overall site restoration completion dates are as follows:

| Site | Date |
|---|---|
| Nevada Test Site | 2014 |
| Amchitka Island | 2001 |
| Central Nevada Test Site | 2006 |
| Gasbuggy | 2005 |
| Gnome-Coach | 2004 |
| Rio Blanco | 2005 |
| Rulison | 1998 |
| Salmon Site | 1999 |
| Shoal | 2004 |
| Tonopah Test Range | 2007 |

The estimated EM life-cycle cost of Nevada Operations Office site cleanup is $2.2 billion (constant 1998 dollars) with environmental restoration ending in 2014, and waste management for low-level waste disposal activities ending in 2070. Long-term surveillance and monitoring will continue after restoration activities are complete.

The projected cost profile for environmental management associated with the Nevada Operations Office is developed by combining the cost estimates in each of the Project Baseline Summaries. Exhibit E-25 displays the resultant baseline cost profile.

### *E.5.3 Work Scope Summary*

The Environmental Management program at the Nevada Test Site consists of three divisions: Environmental Restoration, Waste Management, and Energy Technologies. Each division ensures that all federal laws and regulations are followed at DOE sites in the process of investigation, remediation, handling, transportation, disposal, and monitoring of the contaminated materials generated through weapons testing activities. For purposes of this document, only two of the divisions will be discussed, Environmental Restoration and Waste Management. The sections below describe the scope of work at the Nevada Operations Office. The volumes reported are approximate, and correspond to the major waste, material, and media flows, potential treatment processes, and off-site disposal destinations presented in Exhibit E-26, the Nevada Operations Office Conceptual Summary Disposition Map.

#### Environmental Restoration

The Environmental Restoration division determines remedial solutions to areas contaminated by nuclear weapons testing activities. The environmental restoration process involves identifying the nature of the contamination, determining the risk to the public and the environment, acting to protect or restore the natural resources adversely affected by the releases of hazardous substances, and monitoring to

ensure the safety of the site. Four main areas of remediation have been identified by the Nevada Operations Office: the Underground Test Areas (UGTA), the Industrial Sites, the Soil sites, and the Offsites. The Nevada Operations Office also has projects for Program Integration and Agreements in Principle and Grants.

**Underground Test Areas** were contaminated by underground nuclear detonations above and within the water table. In order to ensure long-term health and safety, modeling and monitoring is conducted to predict movement of radionuclides in the groundwater.

**Industrial Sites** are areas contaminated with hazardous constituents from support activities from nuclear testing. These sites include discarded batteries, drums with diesel and gas, and old munition sites. Of the identified sites, many are easily remediation by simple removal actions, however, there are numerous sites that require more complex remedial action, and may result in the isolation of the contamination.

**Soil Sites** are those where atmospheric and near-surface nuclear tests were conducted resulting in the contamination of surface soil. The soil is characterized, removed, safely packaged, and disposed of at a NTS waste management site.

**Offsites** are testing areas outside the NTS. The NTS is responsible for remediating off-site locations in Alaska, Colorado, Mississippi, Nevada and New Mexico. Remediation at these sites ranges from the drainage and excavation of a pond to the removal of petroleum products, to the recapping of an underground test area, to the removal of radionuclide contaminated soil.

The volumes associated with NTS remediation include approximately 480,000 cubic meters of environmental media contaminated with hazardous substances, of which 300,000 cubic meters are expected to be closed in-place, 20,000 cubic meters are expected to be disposed of at an on-site landfill, and the remaining volume is expected to be disposed of at an off-site commercial hazardous facility. NTS remediation also includes approximately 2.6 million cubic meters of low-level and mixed low-level contaminated environmental media, of which 2.3 million cubic meters are expected to be closed in-place and 15,000 cubic meters are expected to be managed through access and institutional controls. An additional 800 cubic meters are expected to be disposed of at an off-site commercial facility and 210,000 cubic meters are expected to be disposed of on site.

## Waste Management

Nevada Operations Office Waste Management activities are grouped into four projects: Transuranic and Mixed Transuranic, Mixed Low-Level Waste, Low-Level Waste, Mixed Low-Level Waste, and Program Management. Waste Management activities are designed to safely store and / or dispose of the waste generated by DOE activities throughout the complex. There are approximately 670 cubic meters of

legacy transuranic waste are currently in inventory and five cubic meters are expected to be generated over the life-cycle of cleanup operations. After repackaging, approximately 680 cubic meters are expected to be shipped to Waste Isolation Pilot Plant (WIPP) in New Mexico for disposal. Mixed low-level waste generated on site will be treated and disposed of either on site or off site. Approximately 368 cubic meters of low-level waste and 15 cubic meters of mixed low-level waste are currently in inventory. Additionally, the Nevada Test Site expects to receive approximately 190,000 cubic meters of low-level waste from other DOE sites for disposal at the Nevada Test Site. Low-level waste received from approved generators currently identified in the Nevada Test Site Environmental Impact Statement Record of Decision will be disposed of at the Radioactive Waste Management Sites in Areas 3 and 5 on the Nevada Test Site.

Exhibit E-27 illustrates Nevada's environmental management costs by major work scope categories. Remedial action costs drive the overall cost for the environmental management program at the Nevada Operations Office.

### *E.5.4 Critical Closure Path and Programmatic Risk*

The critical closure path schedule presented as Exhibit E-28 sets forth the timetable for completing the closure activities at Nevada Operations Office. Completion of the EM mission at the Nevada Operations Office as scheduled will depend on the timely accomplishment of critical activities and milestones. In the exhibit, the bars represent critical activities, while the diamonds represent events / milestones. Sites have assigned programmatic risk scores to each of the critical activities / milestones.

Appendix D provides a complete definition of programmatic risk. Exhibit E-29 presents a summary of activities/milestones on the critical closure path that have high programmatic risk (programmatic risk scores of 4 or 5 in any category). Nevada has three critical activities/events with high programmatic risk (i.e., risk scores of 4 or 5 in any category), including the certification and approval of the Nevada Test Site TRU waste characterization program and shipment of this waste to WIPP.

## Exhibit E-29
## Summary of High Programmatic Risk Activities/Milestones: Nevada Operations Office

| Site | Project, Activity, Event | Start/End Dates | Programmatic Risk Categories | | |
|---|---|---|---|---|---|
| | | | Technological | Work Scope Definition | Intersite Dependency |
| NTS | Waste Management Preliminary Environmental Impact Statement | May 98 | NA | 5 | 5 |
| | Resource Management Plan (RMP) completed | Oct 98 | NA | 5 | 1 |
| | Certification/approval of the NTS TRU waste characterization program and shipment of waste to WIPP | Jan 96/ Sep 03 | 4 | 2 | 5 |

## E.6 Oak Ridge Operations Office Summary

The mission of the Oak Ridge Operations Office is to oversee and manage various facilities and programs related to the Office of Nuclear Energy, Energy Research, Uranium Enrichment, Defense Programs, and Environmental Management in Tennessee, Ohio, Kentucky, and Missouri. The largest Oak Ridge Operations Office site, the Oak Ridge Reservation located in Oak Ridge, Tennessee, has approximately 1,100 acres of unlined radioactive and mixed waste burial grounds, inactive tanks, surplus facilities, and unlined ponds. As a result, soil, surface water, groundwater, and two major rivers in the area are contaminated. To address these issues and the issues at the Paducah Gaseous Diffusion Plant, the Portsmouth Gaseous Diffusion Plant, and the Weldon Spring Site, the Oak Ridge Operations Office has developed an aggressive strategy for the accelerated completion of its Office of Environmental Management mission.

*Three of the Oak Ridge Operations Office facilities are located on the Oak Ridge Reservation: the Oak Ridge National Laboratory, the Y-12 Plant; and the East Tennessee Technology Park. The Uranium Enrichment Gaseous Diffusion Plants in Paducah, Kentucky, and Portsmouth, Ohio, are also managed by the Oak Ridge Operations Office. Oak Ridge Operations Office is also responsible for the cleanup at the Weldon Spring Site in Missouri.*

***Oak Ridge National Laboratory*** is one of the country's largest multi-disciplinary and multi-program laboratories and research facilities. Weapons research facilities were established at the site of the Oak Ridge National Laboratory in 1943 as part of the World War II Manhattan Project. The laboratory's original mission was to produce and chemically separate the first gram quantities of plutonium as part of the national effort to produce the atomic bomb.

***Y-12 Plant*** was built in 1943 as part of the Manhattan Project. The original mission of the Oak Ridge Y-12 Plant was a uranium enrichment and nuclear weapons production facility. Since World War II, the role of the Y-12 Plant has evolved into supporting highly sophisticated manufacturing; development engineering

associated with the production, fabrication, and dismantlement of nuclear weapons components; and the national repository for enriched uranium.

The ***East Tennessee Technology Park*** (formerly K-25) was built as part of the Manhattan Project during World War II to supply enriched uranium for nuclear weapons production. From 1959 to 1969, the focus shifted to the production of commercial-grade, low-enriched uranium. Because of the declining demand for enriched uranium, the enrichment process was placed on standby in 1985 and shut down permanently in 1987. Currently, an effort is underway to industrialize ETTP by leasing facilities to private companies.

Construction of the ***Paducah*** and ***Portsmouth Gaseous Diffusion Plants*** began in the early 1950s to expand the federal government's gaseous diffusion program already in place at Oak Ridge, Tennessee. The facilities were built to increase the production of enriched uranium for defense and non-defense needs.

The ***Weldon Spring Site*** was part of a site used by the U.S. Army as an ordnance works in the 1940s. In the 1950s and 1960s, the Atomic Energy Commission used the site to process uranium ore in the Weldon Spring Chemical Plant. The plant was subsequently deactivated and no activities were carried out at the Weldon Spring Site until remediation began in 1985.

### *E.6.1 End State*

The overall end state of the sites managed by the Oak Ridge Operations Office is assumed to be composed of some combination of controlled access, restricted industrial, and open space/recreational. An effort is currently underway to strengthen the end use assumptions through a process of stakeholder involvement. The Site-Specific Advisory Board has formed the End Use Working Group to develop end use assumptions that can be used to guide cleanup activities on the Oak Ridge Reservation. Actual end use objectives will be identified in the appropriate watershed or subproject Records of Decision.

At the Paducah and Portsmouth Gaseous Diffusion Plants and the Weldon Spring Site, discussions with the regulators and stakeholders will continue. The Paducah Gaseous Diffusion Plant continues to inform its Site-Specific Advisory Board concerning the prioritization and sequencing of work, and the Portsmouth Gaseous Diffusion Plant continues meeting with the U.S. Environmental Protection Agency and the Ohio Environmental Protection Agency.

Exhibit E-30 provides a summary of the anticipated site end states for Oak Ridge Operations Office.

## Exhibit E-30
## Summary of Oak Ridge Operations Office End States

| Site Name | End State Description |
|---|---|
| Oak Ridge Reservation (ORR) | The Oak Ridge Reservation is comprised of the Oak Ridge National Lab (ORNL), the East Tennessee Technology Park (ETTP; formerly called K-25), and the Oak Ridge Y-12 Plant. Legacy waste stored at the ORR site will be disposed by 2006 for all transuranic waste, 2008 for all mixed low-level waste, and 2013 for all low-level waste. At ORNL, buried waste in both the Melton and Bethel Valleys will remain isolated in place with engineered and institutional controls implemented to prevent migration. Most contaminated media will be remediated in-situ, but hot spots and mercury contaminated soils will be excavated. Contaminated sediments in White Oak Creek, White Oak Lake, and White Oak Creek Embankment will be stabilized. Inactive buildings will be decontaminated and dismantled to grade except for the ORNL Graphite Reactor, which will be preserved as a national landmark. The Y-12 Plant will support restricted industrial, controlled access, and open space/recreational end uses. Burial grounds and other sources will be capped with contamination in place. Groundwater will be contained and use will be restricted. Some areas will be under controlled access for secure storage of nuclear materials and waste. The Environmental Waste Management Facility will be constructed on site for disposal of CERCLA waste. The ETTP end use is expected to be open space/ recreational, controlled access, and industrial with restrictions. The site is expected to be an industrial park occupied by private business. Contaminated areas within the reindustrialized area will be contained or consolidated. Selected facilities will be decontaminated and reused. Burial grounds will be capped and hydrologically isolated. |
| Paducah Gaseous Diffusion Plant | End use for the property will be restricted industrial, open space/ recreational, and controlled access. Several landfills or burial grounds will be closed with contamination remaining in place in the industrial area. Facilities will be cleaned for release or reuse, with deed restrictions or use limitations for areas with residual contamination. The off-site groundwater plumes will require long-term pump and treat operations to reduce migration and prevent discharges to surface water. |

Exhibit E-30 (Continued)

| Site Name | End State Description |
|---|---|
| Portsmouth Gaseous Diffusion Plant | End use for the property will be restricted industrial, open space/ recreational, and controlled access. Major sources of on-site contamination will be contained and/or remediated. Reindustrialization of existing DOE facilities is a possibility with deed restrictions or land use limitations on areas with contamination remaining in place. Several landfills or burial grounds will be closed with contamination remaining in place. Active groundwater treatment facilities will be shut down in 2050. Passive groundwater monitoring and treatment will continue until 2055. |
| Weldon Spring Site Remedial Action Project | The end state for the Weldon Spring site includes a permanent on-site 62-acre disposal cell. The remaining 155 acres of the Chemical Plant site will be released to the appropriate agency for unrestricted use and the 9-acre quarry will be released for recreational use. The disposal cell will remain under controlled access. |

### *E.6.2 Cost and Completion Dates*

Oak Ridge Operations Office has divided its environmental management work into 28 discrete projects. A Project Baseline Summary exists for each project and contains detailed programmatic information, including cost, schedule, scope, end state, and interim milestones. A summary of the Oak Ridge cost and schedule information is illustrated in Exhibit E-31. For additional information about these projects, see the Project Baseline Summaries.

The estimated EM life-cycle cost of Oak Ridge Operations Office's site cleanups is $13.1 billion (constant 1998 dollars). The overall site completion dates are as follows:

| Site | Date |
|---|---|
| Center for Energy and Environmental Research | 1998 |
| Oak Ridge Reservation | 2013 |
| Paducah Gaseous Diffusion Plant | 2010 |
| Portsmouth Gaseous Diffusion Plant | 2005 |
| Weldon Spring Site | 2002 |

The projected cost profile for environmental management associated with the Oak Ridge Operations Office is developed by combining the cost estimates in each of the Project Baseline Summaries. Exhibit E-32 displays the resultant baseline cost profile.

### *E.6.3 Work Scope Summary*

The scope of work at the Oak Ridge Operations Office encompasses the Oak Ridge Reservation, Portsmouth and Paducah Gaseous Diffusion Plants, and the Weldon Spring site. Cleanup activities at these sites include the management of depleted uranium and spent nuclear fuel; treatment of off-site mixed low-level waste at the Toxic Substances Control Act (TSCA) incinerator; and disposal of contaminated soils and debris at the Weldon Spring disposal cell. Cleanup activities include the deactivation of 33 facilities, the decommissioning of 401 facilities, and the cleanup of 642 release sites. The sections below describe the major waste, material, and contaminated media volumes to be addressed by the Oak Ridge Operations Office. The volumes reported are approximate, and correspond to the major waste, material, and media flows, potential treatment processes, and off-site disposal destinations presented in Exhibit E-33, the Oak Ridge Operations Office Conceptual Summary Disposition Map.

#### Transuranic Waste

Approximately 2,300 cubic meters of transuranic waste are currently in inventory and 3,500 cubic meters of transuranic waste over the life cycle of operations. After treatment and repackaging, 2,400 cubic meters are expected to be disposed of at the Waste Isolation Pilot Plant (WIPP).

## Other Waste

Approximately 41,000 cubic meters of mixed low-level waste are currently in inventory and nearly 31 million cubic meters of solid and liquid low-level waste are expected to be generated over the life cycle of operations. After undergoing a range of treatment activities, 16 million cubic meters of treated effluent will be discharged under an NPDES permit, and an additional amount of solid waste is expected to be disposed of at an undetermined facility.

In addition to one million cubic meters of low-level waste that are currently in inventory, 860 cubic meters of low-level waste are expected to be transferred from other sites and 52 million cubic meters of low-level waste waters and liquids are expected to be generated over the life cycle of operations. After treatment, 51 million cubic meters of treated effluent will be discharged under an NPDES permit, and an additional 900,000 cubic meters are expected to be directly disposed of on site at Weldon Spring.

## Remedial Action and Facility D&D

Over 14 million cubic meters of environmental media including solids, sludge, and debris and groundwater contaminated with hazardous substances are planned to be managed. Media will undergo a range of treatment activities including off-site commercial treatment. After treatment, 11 million cubic meters of effluent will be discharged under an NPDES permit and undetermined volumes are expected to be disposed of on-site and at an off-site commercial facility. An additional undetermined volume will be capped in place and maintained under access and institutional control.

Over 17 million cubic meters of contaminated environmental media including soils, sludges, debris, and groundwater contaminated with radionuclides and hazardous substances are planned to be managed. Media will undergo a range of treatment including off-site commercial incineration. After treatment, 15 million cubic meters of treated effluent will be discharged under an NPDES permit, and undetermined volumes are expected to be disposed of in a CERCLA disposal cell and an undetermined facility. An additional undetermined volume is expected to be contained in place and maintained under access control.

## Nuclear Materials

Quantities of the following materials for this program are sensitive and cannot be disclosed in this document. Classified volumes of plutonium and uranium metals, oxides, and solutions will be managed; some will be

converted to UF6 and transferred to the United States Enrichment Corporation; remaining volumes will be transferred to other DOE sites for reuse, recycling, or disposal.

### Spent Nuclear Fuel

Less than one metric ton heavy metal of spent nuclear fuel will be managed. After disassembly and repackaging, spent nuclear fuel will be transferred to the Savannah River Site and the Idaho National Engineering and Environmental Laboratory.

Exhibit E-34 displays site closure costs at the Oak Ridge Operations Office by major work scope category.

## *E.6.4 Critical Closure Path and Programmatic Risk*

The critical closure path schedule presented as Exhibit E-35 sets forth the timetable for completing the closure activities at Oak Ridge Operations Office. The highlighted activities show the critical closure path, which represents the series of events that drive the overall completion date for the site. In Exhibit E-35, the bars represent critical activities, and the diamonds represent milestones and critical events.

Completion of the EM mission at Oak Ridge Operations Office as scheduled will depend on the timely accomplishment of critical activities and milestones. Sites have assigned programmatic risk scores to each of the critical activities / milestones. Appendix D provides a complete definition of programmatic risk. Exhibit E-36 presents a summary of activities / milestones on the critical closure path that have high programmatic risk (programmatic risk scores of 4 or 5 in any category). For cleanup activities, the major uncertainties are in the definition of work scope. Cleanup actions are assumed and may change after the approval of decision documents. For certain waste management activities, disposal location is uncertain which results in a high programmatic risk. The high programmatic risk will decrease after the disposal agreements are reached. The Oak Ridge Operations Office version of *Paths to Closure* provides more details on the management approach for these high programmatic risk issues.

## Exhibit E-36
## Summary of High Programmatic Risk Activities/Milestones: Oak Ridge Operations Office

| Site | Project, Activity, Event | Start/EndDates | Programmatic Risk Categories | | |
|---|---|---|---|---|---|
| | | | Technological | Work Scope Definition | Intersite Dependency |
| ORR | Record of Decision (ROD) for contaminated areas in the ORNL Melton Valley within the Melton Valley Watershed | Oct 96/ Jun 98 | 3 | 5 | 1 |
| | Bear Creek Valley ROD for multiple contaminant sources, groundwater & surface water west of the Y-12 Plant | Oct 96/ Oct 98 | 2 | 5 | 1 |
| | Bethel Valley ROD for contaminated areas in the Bethel Valley Watershed | Oct 96/ Apr 99 | 2 | 5 | 1 |
| | ETTP ROD for contaminated areas, groundwater and surface water | Oct 96/ Sep 99 | 2 | 5 | 1 |
| | UEFPC ROD for multiple contaminant sources and commingled surface and groundwater | Oct 96/ Apr 00 | 2 | 5 | 1 |
| | Construction of Environmental Management Waste Management Facility | Oct 98/ Sep 00 | 2 | 5 | 1 |
| | Bear Creek Valley Boneyard/ Burnyard | Oct 98/ Sep 03 | 2 | 5 | 1 |
| | K-29, K-31, K-33 Process Equipment D&D | Oct 97/ Sep 03 | 2 | 5 | 1 |
| | SWSA 5 North and South Remediation | Oct 99/ Sep 04 | 2 | 5 | 1 |
| | TRU steady state | Sep 06/ Sep 06 | 2 | 2 | 5 |
| | K-25, K-27 Process Equipment D&D | Oct 02/ Sep 07 | 2 | 5 | 1 |
| | K-25/27/29 Building Demolition | Oct 04/ Oct 09 | 2 | 5 | 1 |
| | Bear Creek Valley Groundwater Remediation | Oct 05/ Sep 10 | 2 | 5 | 1 |

## Summary of High Programmatic Risk Activities/Milestones: Oak Ridge Operations Office

| Site | Project, Activity, Event | Start/EndDates | Programmatic Risk Categories | | |
|---|---|---|---|---|---|
| | | | Technological | Work Scope Definition | Intersite Dependency |
| ORR | Metal Recovery Facility D&D and demolition of ORNL bldg & cells used for uranium recovery & other materials from fuel/waste | Oct 98/ Sep 10 | 2 | 5 | 1 |
| | UEFPC Soil Remediation | Oct 02/ Sep 10 | 2 | 5 | 1 |
| | Disposition of legacy LLW | Sep 98/ Sep 13 | 2 | 2 | 5 |
| | White Oak Creek Remediation | Oct 04/ Sep 13 | 2 | 5 | 1 |
| Paducah | Complete Sources of Off-Site Contamination | Jan 99/ Sep 03 | 1 | 5 | 1 |
| | Complete site evaluations of low risk WAGS (WAG 30), 8 release sites | Oct 96/ Sep 04 | 1 | 5 | 1 |
| | Complete sources of Off-Site Contamination (WAG 3) by Investigation and remediation of 3 Burial Grounds | Oct 96/ Sep 04 | 1 | 5 | 1 |
| | Cleanup groundwater and surface water units | Oct 03/ Sep 10 | 2 | 5 | 1 |

## E.7 Oakland Operations Office Summary

The Oakland Operations Office oversees a wide range of programs and nine sites throughout California and one in New York State. Oakland's mission is to manage risks at these multiple research facilities which are contaminated with various hazardous and radioactive materials. The Office of Environmental Management (EM) activities at each of these sites vary. However, Oakland plans to have all EM missions completed at all sites (excluding the Separations Process Research Unit) by 2006. After the EM mission is complete, most sites have ongoing research missions that will be managed by the owner, however, the decision regarding the management of newly-generated waste is still pending.

***Energy Technology Engineering Center (ETEC)*** is located in the Simi Hills of Ventura County, approximately 30 miles northwest of downtown Los Angeles. The Energy Technology Engineering Center consists of government-owned buildings that occupy 90 acres owned by Boeing North American, Rocketdyne Division on the Santa Susana Field Laboratory. ETEC was established in the mid-1960s as a Department of Energy (DOE) laboratory to support nuclear research and energy development projects. All nuclear-related research ended by 1989. Office of Nuclear Energy activities at ETEC were terminated at the end of 1995. At ETEC the EM cleanup mission is focused primarily on remediating contaminated groundwater and soils in addition to the decontamination and decommissioning (D&D) of several buildings.

***General Atomics (GA)*** occupies two contiguous sites that are located approximately 13 miles north of downtown San Diego. The overall mission of the EM program at General Atomics is the decontamination and demolition of the Hot Cell Facility.

The Hot Cell Facility, which General Atomics owns and operates, has been used for numerous post-irradiation examinations of Department fuels, structural materials, reactor dosimetry materials, and instrumentation.

***General Electric Vallecitos Nuclear Center (GE)*** is a privately-owned commercial site where past DOE operations have been performed. Past DOE fuel examination activities were responsible for contaminating the General Electric Vallecitos Nuclear Center high-level Hot Cell #4 and the Emissions Spectrograph (Glovebox). EM activities at the General Electric Vallecitos Nuclear Center are limited to the cleanup of these two areas.

The cleanup mission at the ***Geothermal Test Facility (GTF)*** was completed in the first quarter of FY 1997.

***Laboratory for Energy-Related Health Research (LEHR)*** is an inactive research facility where, for a period of 30 years, DOE and its predecessors funded radiation-related studies using animals. The research program, concluded in 1988, was conducted by the University of California at Davis (UCD). In 1990, DOE initiated site restoration activities with emphasis on facility decontamination and the removal of high risk radioactive sources. In 1994, the LEHR site, along with the UCD landfills and burial trenches, were added to the U.S. Environmental Protection Agency's National Priority List. Under the terms of an agreement between DOE and the University, DOE is responsible for the remediation of contaminated areas including domestic and septic tanks, burial trenches, dry wells, underground waste treatment facilities, leach fields, and about four acres of outside dog pen facilities.

***Lawrence Berkeley National Laboratory (LBNL)*** occupies 134 acres adjacent to the Berkeley Campus of the University of California. In the early 1930s, the University of California leased land to the U.S. Department of Energy (DOE) for construction of the Lawrence Berkeley National Laboratory where DOE conducted numerous of research activities. Buildings were constructed for a wide variety of energy-related research activities, including nuclear and high-energy physics, accelerator research and development, materials research, geology, molecular biology, and biomedical research. EM activities at LBNL involve remediation of soil and groundwater contamination produced by those activities.

***Lawrence Livermore National Laboratory (LLNL)*** is composed of two sites, the Main Site and Site 300, both located approximately 50 miles east of San Francisco. DOE and the University of California jointly operate both sites. The Livermore Main Site was converted from agricultural use by the U.S. Navy in 1942 as a flight training base and for aircraft assembly, repair, and overhaul. In 1952 the site was transferred to the Atomic Energy Commission (AEC). Under AEC, the site became a weapons design and basic physics laboratory and continues with this mission under DOE today. Initial releases of hazardous materials occurred at the Livermore Site in the 1940s when the site was a Naval Air Station. There is also evidence that localized spills, leaking tanks, and impoundments and landfills contributed volatile organic compounds (VOCs), fuel hydrocarbons (FHCs), metals, and tritium to groundwater and unsaturated sediments after the Navy era.

The LLNL Main Site was added to the EPA's National Priority List (NPL) in 1987. The purpose of this project is to characterize existing contamination and to effectively remediate soil and groundwater.

Site 300 was placed on the NPL in 1990 principally because of high concentrations of trichloroethylene (TCE) in groundwater and two off-site TCE groundwater plumes. A Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Federal Facility Agreement was negotiated between DOE/LLNL, EPA, the State Department of Toxic Substances Control, and the California Central Valley Regional Water Quality Control Board in 1992 for Site 300 and 1998 for the Main Site.

***Separations Process Research Unit (SPRU)***, located at the Knolls Site of the Knolls Atomics Power Laboratory (KALP) near Schenectady, New York, is an inactive complex requiring decontamination and decommissioning. The SPRU was a pilot plant used for developing the redox and purex processes for extracting both uranium and plutonium from irradiated fuel. As a result of this work conducted by the Materials Production Division of the Atomic Energy Commission (AEC) in the early 1950s, associated buildings and the surrounding ground became contaminated. The complex, in standby status since 1953, has been accepted into the Department of Energy's EM program for decontamination and decommissioning of contaminated facilities and remediation of contaminated soils. Until such decommissioning activities begin, a surveillance and monitoring program is in place to ensure that the facility remains in a stable condition and that it does not present an unacceptable risk to the public, the environment, or the on-site work force.

***Stanford Linear Accelerator Center (SLAC)*** is a high energy research facility, established in 1962, which is owned and operated by Stanford University under contract to DOE. The Center's four major experimental facilities are the Linear Accelerator, the Positron Electron Project Storage Ring, the Stanford Positron Electron Asymmetric Ring, and the Stanford Linear Accelerator Center Linear Collider. The primary objective of SLAC's EM program is to clean up contaminated soils and groundwater and to return the land to the site landlord, the Office of Energy Research, by the end of FY 2000 for beneficial use.

### *E.7.1 End State*

Exhibit E-37 provides a summary of the anticipated end states for the Oakland Operations Office sites.

## Exhibit E-37
## Summary of Oakland Operations Office End States

| Site Name | End State Description |
|---|---|
| Energy Technology Engineering Center | Environmental Management is responsible for remediation. Remediation will be complete by FY 2006, and the site will be turned over to Boeing North American. All wastes are being shipped off-site. End state use will probably be industrial. |
| General Atomics | The site is expected to be fully remediated by FY 2000. The Hot Cell Facility will be decontaminated and decommissioned, and the site will be released as NRC no-rad restriction. Soil cleanup limits are based on an industrial land use. All wastes are being shipped off site, some to INEEL. DOE maintains liability at the site until all of the waste is off of the site. |
| General Electric Vallecitos Nuclear Center | Remediation of this site is expected to be complete by 2005, at which time DOE will have no further obligations to General Electric. The hot cell will be turned over to GE, who plans on using it commercially, though a portion of the site will be zoned industrial. |
| Geothermal Test Facility | The site was completed in the first quarter of FY 1997, and was turned over to the Bureau of Land Management in 1997 for unrestricted use. The brine pond waste material was removed and disposed of off site. No long-term monitoring, surveillance, or maintenance is required. A NEPA categorical exclusion was issued in accordance with 10 CFR 1021, Appendix B 6.1. |
| Laboratory for Energy-Related Health Research | Site cleanup will be complete by 2002. Closure of the RCRA storage facility is expected to end by FY 2001. UC-Davis is responsible for a radioactive waste burial trench and three landfills that are on-site. Post-closure monitoring will primarily be the responsibility of UC-Davis. The four buildings that DOE is responsible for will be released for unrestricted use. All waste will be shipped off site. |
| Lawrence Berkeley National Laboratory | LBNL has an ongoing mission with continued generation of hazardous, mixed, and radioactive wastes. A groundwater treatment system is expected to be in place by 2003. Clean closure of the Hazardous Waste Handling Facility (HWHF) will be completed in FY 1998, and a new HWHF was constructed in FY 97. No soil remediation of the HWHF is expected. Currently, no definitive cleanup level has been established for tritium in groundwater. |

Exhibit E-37 (Continued)

| Site Name | End State Description |
|---|---|
| Lawrence Livermore National Laboratory - Main Site | LLNL expects to continue to occupy and conduct research at the Main Site indefinitely. Future land use is expected to be industrial. VOCs have contaminated groundwater sources on and off site. Remediation of the soil and groundwater is in progress. By 2006, all of the soil and groundwater treatment facilities will be operating. No solid waste disposal will occur on site. DOE will continue to own and manage the site. |
| Lawrence Livermore National Laboratory - Site 300 | LLNL expects to continue to occupy and conduct research at Site 300 indefinitely. Groundwater treatment systems will be in place and operational by FY 2006. Access will continue to be controlled. The land will continue to be a mix of industrial and wildlife areas. No solid waste disposal will occur on site. |
| Separations Process Research Unit | All radiological and hazardous contamination (LLW, MLLW, TRU, MTRU, HLW) will be disposed of off site. The majority of cleanup activities will occur between 2006 and 2014. The area is expected to be released for unrestricted use by the owner, Knolls Atomic Power Laboratory. |
| Stanford Linear Accelerator Center | This site has an ongoing mission as an active research facility. Cleanup of the contaminated areas will be completed by Environmental Restoration and the site returned to the Office of Energy Research by 2000. A network of wells has been installed to monitor groundwater contamination. SLAC will be cleaned to industrial use levels. Long-term monitoring responsibilities will be transferred to the site landlord, the Office of Energy Research. Contaminants will remain in the soil at depths of 10 to 20 feet near the Former Solvent Underground Storage Tank Area. |

### *E.7.2 Cost and Completion Dates*

Oakland Operations Office has divided its EM work into 21 discrete projects. A Project Baseline Summary exists for each project and contains detailed programmatic information, including cost, schedule, scope, end state, and interim milestones. A summary of the Oakland cost and schedule information is illustrated in Exhibit E-38. For additional information about these projects, refer to the Project Baseline Summaries.

The estimated life-cycle cost of Oakland Operations Office's environmental management work scope is $1.0 billion (constant 1998 dollars). This estimate does not include approximately $1.1 billion (constant 1998 dollars) in costs associated with the generation of new wastes that are expected to be the responsibility of the generator.

The overall site completion dates of EM work scope (excluding long-term surveillance and monitoring) are as follows:

| Site | Date |
|---|---|
| Energy Technology Engineering Center | 2006 |
| General Atomic Sites | 2000 |
| General Electric Vallecitos Nuclear Center | 2005 |
| Geothermal Test Facility | 1997 |
| Laboratory for Energy-Related Health Research | 2002 |
| Lawrence Berkeley National Laboratory | 2003 |
| Lawrence Livermore National Laboratory - Main Site | 2006 |
| Lawrence Livermore National Laboratory - Site 300 | 2006 |
| Separations Process Research Unit | 2014 |
| Stanford Linear Accelerator Center | 2000 |

The projected cost profile for environmental management associated with the Oakland Operations Office is developed by combining the cost estimates in each of the Project Baseline Summaries. Exhibit E-39 displays the resultant baseline cost profile.

### *E.7.3 Work Scope Summary*

The EM cleanup mission at Oakland Operations Office involves work at nine remaining sites (GTF was completed in 1997). Cleanup activities at these sites include the management of groundwater contaminated with volatile organic

compounds at Lawrence Livermore National Laboratory and the management of transuranic waste at SPRU. The sections below describe the major waste, material, and contaminated media volumes to be addressed by the Oakland Operations Office. The volumes reported are approximate, and correspond to the major waste, material, and media flows, potential treatment processes, and off-site disposal destinations presented in Exhibit E-40, the Oakland Operations Office Conceptual Summary Disposition Map.

### Transuranic Waste

- Approximately 300 cubic meters of legacy transuranic waste are currently in inventory and 880 cubic meters are expected to be generated over the life-cycle of operations. After characterization, repackaging, and size reduction, approximately twelve hundred cubic meters are expected to be disposed of at the Waste Isolation Pilot Plant (WIPP).

### Other Waste

- Approximately 470 cubic meters of mixed low-level waste are currently in inventory and 13,000 cubic meters are expected to be generated over the life-cycle of operations. After treatment, 8,200 cubic meters are expected to be disposed of at an undetermined facility.
- Approximately 4,200 cubic meters of low-level waste are currently in inventory and 58,000 cubic meters are expected to be generated over the life-cycle of operations, of which 660 cubic meters are expected to be reused or recycled. The remainder will be processed and 60,000 cubic meters are expected to be disposed of off-site at either the Nevada Test Site, Hanford, or a commercial disposal facility.

### Remedial Action and Facility Deactivation and Decommissioning

- Approximately 43 million cubic meters of hazardous contaminated environmental media, including groundwater, will undergo a variety of responses including in-situ treatment, institutional controls, and on-site and off-site treatments such as air stripping, charcoal absorption, and vapor extraction. Following treatment, approximately 21,000 cubic meters are expected to be disposed of off-site at a commercial disposal facility.
- Approximately 70 cubic meters of transuranic contaminated environmental media, some of which are expected to be precessed on-site and disposed of at WIPP.
- Approximately 2.1 million cubic meters of mixed low-level and low-level contaminated environmental media will be managed and treated. Nearly 8,600 cubic meters are expected to be disposed of off-site at a DOE site or a commercial disposal facility.

### Nuclear Materials

- Nuclear materials quantities are sensitive and cannot be disclosed in this document.

### Spent Nuclear Fuel

- Less than one metric ton heavy metal of spent nuclear fuel will be stabilized and then shipped off site to the Idaho National Engineering and Environmental Laboratory for interim storage.

  Exhibit E-41 illustrates Oakland Operations Office environmental management costs by major work scope category. Most costs after 2006 are associated with long-term surveillance and monitoring and the decontamination and decommissioning of SPRU.

## *E.7.4 Critical Closure Path and Programmatic Risk*

The critical closure path schedule presented as Exhibit E-42 sets forth the timetable for completing the closure activities at Oakland Operations Office, where the bars represent critical activities. The Oakland Operations Office's critical closure path reflects those cleanup activities which are key to achieving completion of the sites cleanup mission and end states.

Completion of the EM mission at the Oakland Operations Office as scheduled will depend on the timely accomplishment of critical activities. Appendix D provides a complete definition of programmatic risk. Exhibit E-43 presents a summary of activities / milestones on the critical closure path that have high programmatic risk (programmatic risk scores of 4 or 5 in any category). The Oakland Operations Office version of *Paths to Closure* provides more details on the management approach for these high programmatic risk issues.

Exhibit E-43
Summary of High Programmatic Risk Activities/Milestones:
Oakland Operations Office

| Site | Project, Activity, Event | Start/End Dates | Programmatic Risk Categories | | |
|---|---|---|---|---|---|
| | | | Technological | Work Scope Definition | Intersite Dependency |
| GA | Package and ship irradiated fuel materials to INEEL for interim storage | Jun 95/ Mar 00 | 1 | 4 | 4 |
| LBNL | Complete characterization and certification for offsite disposal of all LBNL legacy waste. | Oct 95/ Sep 70 | 1 | 4 | 3 |
| | Completion of Western Dog Pens Area Removal Action | Apr 00/ Sep 00 | 2 | 3 | 4 |
| LEHR | Completion of disposal of mized low-level waste/material | May 01/ Aug 01 | 2 | 3 | 4 |
| | No Action ROD for DOE Areas | Sep 01/ Jun 02 | NA | 4 | 3 |

## E.8 Ohio Field Office Summary

The Ohio Field Office manages six sites in the states of Ohio and New York. These sites include: Ashtabula Environmental Management Project (RMI Extrusion Plant); Columbus Environmental Management Project (Battelle Columbus Laboratories, two sites); Fernald Environmental Management Project; Miamisburg Environmental Management Project (Mound Plant); and West Valley Demonstration Project. Ohio's current baselines reflect completion of its environmental management cleanup mission at all sites by 2008. However, through acceleration and enhanced performance, the goal is to finish by 2005.

*The Ohio Field Office manages environmental management activities at six sites in the states of Ohio and New York. These sites include: Ashtabula Environmental Management Project; Columbus Environmental Management Project (2 sites); Fernald Environmental Management Project; Miamisburg Environmental Management Project; and West Valley Demonstration Project.*

The ***Ashtabula Environmental Management Project*** encompasses the cleanup activities at the RMI Titanium Company Extrusion Plant (formerly Reactive Metals, Inc.), a privately owned facility. From 1962 to 1988, the company received uranium billets and refined them into various shapes for fuel and target fabrication use by the Department of Energy (DOE) and its predecessor agencies. RMI also performed work for the Department of Defense and a number of commercial entities under a Nuclear Regulatory Commission License. Twenty-six years of handling, extruding, forging, and machining uranium at the facility have resulted in on-site and off-site contamination of buildings and environmental media.

The ***Columbus Environmental Management Project*** decommissioning project consists of 15 buildings and includes two geographically distinct sites (West Jefferson and King Avenue). Between 1943 and 1986, Battelle Memorial Institute (Battelle) performed atomic energy research and development for the Department of Energy and its predecessor agencies. As part of the Government's fuel and target fabrication program, Battelle participated in nuclear research activities that included fabrication of uranium and fuel elements; reactor development; submarine propulsion; fuel reprocessing; and safety studies of reactor vessels and piping.

The uranium metal production operation at ***Fernald Environmental Management Project*** was constructed in the early 1950s to convert uranium ore into uranium metal, and to fabricate the uranium metal into target elements for reactors that produced weapons-grade plutonium and tritium. Production operations continued for more than 36 years, until the Department of Energy suspended them on July 10, 1989.

In 1947, the Dayton Project of the Manhattan Engineering District became the Mound site. Cleanup activities at the Mound site are carried out under the ***Miamisburg Environmental Management Project***. Mound's early mission included nuclear materials research. Later missions included process development, production engineering, manufacturing and surveillance of detonators, explosive timers, transducers, firing sets, explosive pellets, components, and specific test equipment. Additional manufacturing activities at Mound included recovering and purifying tritium.

From 1966 to 1972, Nuclear Fuel Services, Inc., operated a commercial nuclear fuel reprocessing plant at the Western New York Nuclear Services Center under contract to the State of New York. The plant, now referred to as the ***West Valley Demonstration Project***, reprocessed uranium and plutonium from spent nuclear fuel, generating approximately 2.3 million liters (600,000 gallons) of liquid high-level waste that was stored in underground tanks. In 1972, nuclear fuel reprocessing operations were discontinued.

### *E.8.1 End State*

Each of the sites under the Ohio Field Office has a plan in place for end state and long-term stewardship. Exhibit E-44 provides a summary of the anticipated site end states for the Ohio Field Office.

Exhibit E-44

Summary of Ohio Field Office End States

| Site Name | End State Description |
|---|---|
| Columbus Environmental Management Project - King Avenue | King Avenue will be complete in FY 1998, and all 9 buildings and grounds will return to Battelle for re-use without radiological restrictions, according to Nuclear Regulatory Commission (NRC) guidelines. All waste streams, primarily uranium and thorium, will be shipped off site for disposal. The entire Columbus Environmental Management Project will be complete by FY 2005. |
| Columbus Environmental Management Project - West Jefferson | This site will be complete in FY 2005. The end state will return the buildings and adjacent soil areas at this site back to Battelle in a condition for use without radiological restrictions, according to NRC guidelines. All waste streams will be shipped off site for treatment, storage, or disposal. |

Exhibit E-44 (Continued)

| Site Name | End State Description |
|---|---|
| Fernald Environmental Management Project (FEMP) | FEMP will be left in an end state agreed to by the Fernald Citizens Advisory Board and the Community Reuse Organization, although it will still fall under federal ownership. Stakeholders have recommended that specific future use of the site should be determined closer to the time of reuse, but residential and agricultural activities should be avoided. The greatest potential for future use is recreational and industrial. The current FEMP baseline projects that the site will be completed by 2008. However, the Ohio Field Office and FEMP are committed to accomplishing the 2008 completion by the end of FY 2005. FEMP will construct a large on-site disposal facility to contain up to 2.5 million cubic yards of low-level wastes with radiological and/or chemical concentrations exceeding free release limits. There will be controlled access to the disposal facility. By 2008, FEMP will install infrastructure to restore the aquifer to a 20 parts per billion (ppb) uranium contamination level through extraction and treatment of groundwater. |
| Miamisburg Environmental Management Project (MEMP) | Soil remediation to industrial use levels of (approximately 1 x $10^{-5}$ reduced risk) will be completed at Mound in 2003, at which time the site will be sold to the Miamisburg Mound Community Improvement Corporation (MMCIC). The Miamisburg Mound Community Improvement Corporation was formed in order to effectively represent the interests of the local community. Environmental Management will remain the landlord, though the Office of Nuclear Energy (NE) will have a continuing mission at Mound through its use of seven buildings. The landlord costs and cleanup requirements for these buildings are the responsibility of the Office of Nuclear Energy. VOC-contaminated off-site groundwater will be remediated to a residential level prior to FY 2005. Excess nuclear materials will be off site in FY 1998. Currently, MEMP is planned for completion by 2005. Pending validation of the current baseline, it is the goal of the Ohio Field Office and the MEMP Office to clean up the site in 2003. |
| Ashtabula Environmental Management Project (AEMP) | The end state for the AEMP will be reached in 2003 when the site will be released to RMI. RMI will have sole responsibility for future land use. Future use is assumed to be industrial, consistent with surrounding property and zoning. Surficial soils contaminated with uranium will be remediated to less than 30 pci/g. The NRC license will be terminated in 2003 when the property is released. |

Exhibit E-44 (Continued)

| Site Name | End State Description |
|---|---|
| West Valley Demonstration Project (WVDP) | The site is owned by New York State but DOE has exclusive use and possession of the WVDP premises. By the end of FY 2005, DOE will have satisfied its responsibilities for West Valley according to the West Valley Demonstration Project Act, Stipulation of Compromise Settlement, the Cooperative Agreement, and the Record of Decision, after which DOE will not be responsible for any of the decisions involving the future use of the site. The end state for the WVDP involves completion of HLW solidification, and shipment of HLW canisters, LLW, MLLW and TRU in accordance with the WVDP Act stipulation of compromise and ROD. The SNF will be shipped to INEEL. Tanks and facilities will be decontaminated and decommissioned. Operational responsibility will be returned to the New York State Energy Research and Development Authority (NYSERDA). LLW disposal has yet to be determined. |

### *E.8.2 Cost and Completion Dates*

Ohio Field Office has divided its environmental management work into 31 discrete projects. A Project Baseline Summary exists for each project and contains detailed programmatic information, including cost, schedule, scope, end state, and interim milestones. A summary of the Ohio cost and schedule information is illustrated in Exhibit E-45. For additional information on these projects, refer to the Project Baseline Summaries.

The estimated EM life-cycle cost of Ohio Field Office's site cleanups is $4.8 billion (constant 1998 dollars) with the last project ending in 2008. Groundwater remediation and some surveillance and monitoring will continue beyond the site completion date at some sites.

The overall site completion dates are as follows:

| Site | Date |
|---|---|
| Columbus Environmental Management Project - West Jefferson Site | 2005 |
| Columbus Environmental Management Project - King Avenue Site | 1998 |
| Fernald Environmental Management Project | 2008 |
| Miamisburg Environmental Management Project | 2005 |
| Ashtabula Environmental Management Project | 2003 |
| West Valley Demonstration Project | 2005 |

The projected cost profile for environmental management associated with the Ohio Operations Office is developed by combining the cost estimates in each of the Project Baseline Summaries. Exhibit E-46 displays the resultant baseline cost profile.

### *E.8.3 Work Scope Summary*

The Office of Environmental Management's (EM) mission at Ohio consists of various projects focused on the general tasks of decontamination, deactivation, excavation and treatment of contaminated soils, groundwater remediation, the vitrification of high-level waste (West Valley), along with many others. At the Columbus Environmental Management Project King Avenue site, the major work scope revolves around the decontamination of the remaining buildings. The decontamination approach for the buildings follows a standard flow beginning with a physical and radiological survey and ending with the full completion of the decontamination after proceeding through a series of prescribed steps. At the Columbus Environmental Management Project West Jefferson site, a significant effort will be required to process highly contaminated equipment and materials prior to beginning interior decontamination. However, there are a few facilities at the West Jefferson site, the JN-1 hot cells, which will involve a more extensive effort, using remote-controlled operations to reduce levels of contamination within highly radioactive areas. Also, the actual approach may be modified depending on the end-use planned for the West Jefferson buildings.

At the Fernald Environmental Management Project, the scope, cost, and schedule reflected in *Paths to Closure* are as documented in the project baseline. The principal work scope in the baseline after FY 2005 is directly related to the Silos Project,

Facilities Shutdown, Decontamination and Decommissioning, and associated Program Support and Oversight activities. The most significant challenge Fernald faces in accomplishing the Ohio 2005 Vision is accelerating the Silos Project. Once the Fernald Environmental Management Project is completed, the only remaining activities include closure of the On-Site Disposal Facility, finalization of waste management activities and closure of facilities, and in-process groundwater monitoring.

At the Ashtabula Environmental Management Project, the remediation work scope of the RMI Extrusion facility will involve the deactivation of 25 on-site buildings and decontamination and/or demolition of 21; remediation of legacy waste and associated equipment; excavation and treatment/processing of radiologically contaminated soils; and ex-situ vapor stripping of groundwater.

At the West Valley Demonstration Project, the baseline consists of four projects. The first project encompasses the work scope involved in the solidification of high-level waste into borosilicate glass using vitrification. Following this, the project plans to process the tank residual high activity waste. The second project encompasses activities required for removal of high-level waste canisters and transuranic waste from project facilities, disposal of low-level waste and mixed low-level waste in accordance with the Act and Stipulation of Compromise as directed by the final Environmental Impact Statement Record of Decision, and disposition of the remaining project responsibilities. The third project encompasses the work scope involved with the removal of the existing spent nuclear fuel inventory from the site. The fourth project encompasses the general mission and support cost estimates relating to project management, human resources, program planning, Chief Financial Officer, procurement, financial control, information services, training, records management, legal and program reporting functions. These four projects make up the work scope for the West Valley Demonstration Project.

At the Miamisburg Environmental Management Project, the work scope encompasses facility stabilization, disposition of excess nuclear material and ancillary equipment, environmental restoration, decommissioning, and waste management. The disposition of nuclear materials, including tritium, is targeted for completion in FY 1998.

The sections below describe the major waste, material, and contaminated media volumes to be addressed by the Ohio Field Office. The volumes reported are approximate, and correspond to the major waste, material, and media flows, potential treatment processes, and off-site disposal destinations presented in Exhibit E-47, the Ohio Field Office Conceptual Summary Disposition Map.

### Transuranic Waste

- Approximately 770 cubic meters of transuranic waste are currently in inventory and 24 cubic meters are expected to be generated over the life cycle of operations. After characterization, compaction, and packaging, 250 cubic meters are expected to be disposed of at the Waste Isolation Pilot Plant (WIPP), and a remaining 550 cubic meters are expected to be disposed of at a currently undetermined facility.

### High-Level Waste

- Approximately 2,200 cubic meters of high-level waste currently in inventory, will be washed and vitrified. After vitrification, 250 cubic meters are expected to be disposed of at a geologic repository.

### Other Waste

- Approximately 220 cubic meters of mixed low-level waste are currently in inventory and 38 cubic meters are expected to be generated over the life cycle of operations. After treatment, 9.3 cubic meters are expected to be disposed of at an off-site commercial facility, 1.8 cubic meters are expected to be disposed of at a waste water disposal facility, and 45 cubic meters are expected to be disposed of at an undetermined facility.
- Approximately 16,000 cubic meters of low-level waste are currently in inventory and 1,300 cubic meters are expected to be generated over the life cycle of operations. After treatment, 4,400 cubic meters are expected to be disposed of at an undetermined facility.

### Remedial Action and Facility D&D

- There are approximately 2,300 cubic meters of hazardous contaminated environmental media which will be disposed of at an off-site commercial disposal facility.
- Approximately 48 million cubic meters of mixed low-level and low-level contaminated environmental media, including groundwater, will go through treatment, incineration, and/or stabilization. Approximately 1.6 million cubic meters of waste are expected to be disposed of on site at Fernald, and approximately 46 million cubic meters of treated water will be discharged. Additional volumes of waste are expected to be disposed of at a DOE site, a commercial facility, or an undetermined location.
- Approximately 370 cubic meters of environmental media contaminated with transuranic elements will be characterized and repackaged, and 740 cubic meters are expected to be disposed of at WIPP.
- Approximately 3,600 metric tons of uranium residuals are expected to be disposed of at an off-site commercial disposal facility.

### Nuclear Materials

- Currently, there are less than 7 kilograms of nuclear materials in inventory. Of this amount, less than 3 kilograms will be shipped to the Nevada Test Site for disposal and, after packaging, the remaining amount will be shipped off-site to Los Alamos National Laboratory, Oak Ridge Reservation, Savannah River Site, and Portsmouth.

### Spent Nuclear Fuel

- Currently, there are 11 cubic meters of spent nuclear fuel in inventory. This waste stream will be shipped off site for consolidation at the a commercial disposal facility.

Exhibit E-48 shows the distribution of Ohio Field Office EM costs by major category.

## *E.8.4 Critical Closure Path and Programmatic Risk*

The critical closure path schedule presented as Exhibit E-49 sets forth the timetable for completing the closure activities at Ohio Field Office. The highlighted activities show the critical closure path, which represents the series of events that drive the overall completion date for the site. In Exhibit E-49, the bars represent critical activities, and the diamonds represent milestones / events.

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Completion of the EM mission at Ohio Field Office as scheduled will depend on the timely accomplishment of critical activities and milestones. Sites have assigned programmatic risk scores to each of the critical activities / milestones. Appendix D provides a complete definition of programmatic risk. Exhibit E-50 presents a summary of activities / milestones on the critical closure path that have high programmatic risk (programmatic risk scores of 4 or 5 in any category). The Ohio Field Office version of *Paths to Closure* provides more details on the management approach for these high programmatic risk issues.

## Exhibit E-50
## Summary of High Programmatic Risk Activities/Milestones:
## Ohio Field Office

| Site | Project, Activity, Event | Start/End Dates | Programmatic Risk Categories | | |
|---|---|---|---|---|---|
| | | | Technological | Work Scope Definition | Intersite Dependency |
| CEMP | NRC completion date for entire project | Sep 00/ Sep 00 | 3 | 5 | 5 |
| | Initiate TRU waste shipments | Oct 03/ Oct 03 | 3 | 3 | 5 |
| | Building JN-1 D&D | Oct 98/ Sep 05 | 3 | 5 | 5 |
| FEMP | Scope includes packaging, shipping and disposition of all nuclear materials presently on site. Scope is not fully funded. | Oct 96/ Sep 99 | 5 | 4 | 5 |
| | Scope includes processing and disposition of the waste contained in the K-65 silos. | Oct 96/ Sep 08 | 4 | 4 | 3 |
| MEMP | Removal of TRU waste from T Building and ship off site | Oct 97/ Oct 00 | 3 | 4 | 5 |
| | Decon T Building. Safe shutdown of SW and R Buildings. | Oct 97/ Apr 01 | 4 | 3 | 3 |
| | Complete Building SW decommissioning | Jun 98/ Jun 01 | 2 | 5 | 1 |
| | Complete Building R decommissioning | Feb 99/ Jul 01 | 2 | 5 | 1 |

Exhibit E-50 (Continued)

| Site | Project, Activity, Event | Start/End Dates | Programmatic Risk Categories | | |
|---|---|---|---|---|---|
| | | | Technological | Work Scope Definition | Intersite Dependency |
| MEMP | Complete E/E Annex decommissioning | Feb 00/ Oct 01 | 1 | 4 | 1 |
| | Complete D&D/closure of waste processing facilities (19, 72, 57, and 22) | Oct 01/ Dec 02 | 2 | 3 | 4 |
| WVDP | Select HLW receiving site | Sep 98/ Sep 98 | 1 | 1 | 5 |
| | DOE-HQ to issue WV Project Completion Record Of Decision | May 00 | 1 | 5 | 5 |
| | Select TRU receiving site | Jun 00/ Jun 00 | 2 | 5 | 5 |
| | DOE-HQ provides HLW casks, permits, agreements, & transportation program funds | Oct 98/ Mar 01 | 2 | 4 | 4 |
| | Issue WV Project Completion ROD/Develop Implementation Plan for project completion | May 00/ Mar 01 | 2 | 5 | 5 |
| | NRC approval of D&D criteria and Site Decommissioning Plan | Sep 01 | 1 | 4 | 2 |
| | DOE-HQ provides TRU casks, permits, agreements, & transportation program funds | Jul 00/ Sep 02 | 2 | 4 | 4 |
| | Removal of WV HLW & TRU from WV | Oct 01/ Jun 04 | 2 | 5 | 5 |
| | Begin disposition of vitrification facility/tank farm per NRC criteria | Oct 02/ Sep 05 | 2 | 4 | 2 |
| | Begin site decontamination per NRC criteria | Oct 01/ Sep 05 | 2 | 4 | 2 |
| | Complete site decontamination per NRC criteria | Jul 01/ Sep 05 | 2 | 5 | 5 |